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AUTHOR Roberts, Jane M. E.
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ABSTRACT

This paper presents information directly related to the activities of those individuals and organizations engaged in developing and delivering short-term client-responsive syntheses/interpretations. The paper has four main sections: 1) a selective literature review, 2) the results of a survey of state and federally funded organizations engaged in short-term client-responsive synthesis/interpretation, 3) an elaboration of the results in the form of structured opinion, and 4) propositions and questions suggested by survey results. (Author/JD)

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PROCESSES USED IN PREPARING QUICK TURN-AROUND SYNTHESES/INTERPRETATIONS IN RESPONSE TO QUESTIONS FROM PRACTITIONERS

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Jane M. E. Roberts
Regional Exchange
Research for Better Schools, Inc.
444 North Third Street
Philadelphia, PA 19123

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Abstract

This paper describes and discusses the activities of individuals and agencies engaged in the development and delivery of syntheses/interpretations in response to questions from educational practitioners. Following a brief literature review, the paper focuses on the results of a survey designed to determine processes used by such organizations as state capacity building projects and the R&D Exchange. These results are subsequently illustrated by scenarios. Finally, propositions and questions are presented. One example of a proposition derived from the survey results is: In order for a product to be considered a client-responsive synthesis/interpretation, it must satisfy all the following criteria: 1) consensus between client and synthesizer as to the problem addressed, 2) appropriate range of data examined by the synthesizer, 3) data of high quality used, 4) data organized to address the client's problem or task, 5) support (e.g., use of appropriate language) for the client, 6) inclusion of a variety of data, 7) objective and honest presentation of data, and 8) logical coherent integration of data.

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Introduction

This paper is not designed to be a comprehensive treatment of synthesis/interpretation, but presents information directly related to the activities of those individuals and organizations engaged in developing and delivering short-term client-responsive syntheses/interpretations.

Certain perspectives influence the content and organization of the paper, namely:

- Although the major criterion for traditional syntheses may be comprehensiveness, in the case of short-term client-responsive synthesis/interpretation, the key criterion is relevance.
- There is a strong relationship between synthesis/interpretation and dissemination.
- The usefulness of a short-term client-responsive synthesis/interpretation is determined to a great extent by the client's input.

There are two main audiences for this paper (the first of which contributed much of the content): those who carry out short-term synthesis/interpretation activities, and researchers and policy makers interested in learning from the first group.

In addition to this introduction, the paper has four main sections: 1) a selective literature review, 2) the results of a survey of state and federally funded organizations engaged in short-term client-responsive synthesis/interpretation, 3) an elaboration of the survey results in the form of structured opinion, and 4) propositions and questions suggested by the survey results. The paper contains 19 tables which together summarize the results of the survey, and so could be used by those involved in educational linkage as a tool for discussion and review of synthesis/interpretation activities.

A Selective Literature Review

This section is designed to provide a brief overview reflecting structured opinion as presented in selected literature. Sources cited represent particular viewpoints which seem to have direct implications for those engaged in short-term client-centered synthesis/interpretation (S/I) activities. A quick review of potentially useful documents indicates that there appears to be five logical areas for discussion of S/I: assumptions, definitions, processes, products, and use and usefulness. Each of those areas is discussed in turn.

Assumptions

Rich and Goldhar (1977) argue that certain assumptions are made by developers of traditional synthesis products: (1) synthesis processes are designed to solve information overload; (2) the computer will solve our data reduction needs; (3) the synthesis process is a natural part of scientific communication; (4) the "better mousetrap theory" works; (5) if barriers of identification and organization of the "best" knowledge can be overcome, utilization will automatically follow; (6) synthesis is needed and will be welcomed by potential users in the educational community. Rich and Goldhar question each of these assumptions, arguing that, for instance, although there may be an overload of irrelevant information, there may be a scarcity of information relevant to a particular problem at hand.

Moving away from synthesis toward the general field of knowledge utilization, Rich and Goldhar (1977) discuss another common assumption:

"Decision makers are rational and...follow rational decision-making processes." Sieber (1972) argues that the image of the practitioner may be not only as the "rational man" but can also be as "cooperator" or as the "powerless functionary." All three images are passive. Even the cooperator — at the most active — is described as a receptive volunteer whose motivation to cooperate is activated and manipulated by a change agent (Zaltman et al., 1977). In spite of the fact that these assumptions are challenged by recent research, they continue to be held by many developers of educational products and by planners and designers of educational projects.

The scenario that seems to arise from these and similar assumptions pictures a scientist using a computer to analyze, organize, reduce and interpret a mountain of information. Somehow, practitioners will learn of this work and beat a pathway to the ivory tower, collect the "better mousetrap," and immediately find a sensible use for it. Such assumptions are not appropriate for those using a client-centered approach to synthesis/interpretation and the effective transfer and use of knowledge. Instead, those engaged in synthesis activities might explore the assumptions and processes inherent in the Linkage Model.

> The most important assumption of this model is that both internal and external groups will work in a collaboration mode; neither will be the major source of information....Ideally, the problem initially identified should be solved to the satisfaction of both internal and external groups...Adaptation may occur, although goal congruency should remain high.
>
> (Roberts, 1978)

Definitions

Synthesis is defined by The Concise Oxford Dictionary (1952) as "the building up of separate elements especially of conceptions or propositions or facts into a connected whole, especially a theory or system..." Two other definitions are:

> Synthesizing is readily seen as a part of the knowledge production and utilization process; a part that comes after the stockpiling of a sizable amount of findings and conclusions of individual research efforts and after some recognition of a need for a parsimonious integration of some part of that body of literature.
>
> (Gephart, 1979)

> Knowledge synthesis has traditionally been thought of as an effort to collate, compare and/or interpret the current body of scientific and technical knowledge, including research results, outcomes of systematic development, theoretical and speculative writing and evaluations of current field practices.
>
> (Rich & Goldhar, 1977)

All three of these definitions, using "synthesis" as a noun, treat it as an activity, rather than a product.

In a discussion of information analysis activities conducted at an ERIC Clearinghouse, the following description of interpretive syntheses is presented:

> Interpretive information analysis products are particularly useful for practitioners because they explain the significance of research findings. Interpretive reviews point out trends in the literature; they show, for example, where the authors are in agreement and where they are in disagreement. On topics with a large body of research literature that contains conflicting findings, interpretive reviews help the reader to understand quickly what evidence exists for the different conclusions.
>
> (Smith, 1977)

Smith (1977) argues that, in order to reduce the quantity of information and also attempt to maintain quality, there is a need for three

kinds of "information analysis products that interpret for school practitioners the implications of research findings." Each kind of product has a specific purpose, namely: compaction, or evaluation, or interpretation. Compacted products summarize; evaluative products summarize and reflect critical appraisal of the information and the research methodology used to obtain the information; interpretive products summarize information in such a way as to be readily understandable and usable by a particular target audience. Smith appears to view these kinds of products as separate from each other, although he states that elements of any one kind may well be found in the others.

The question of conflict and consensus is raised, not only by Smith, but also by others (e.g., Feldman, 1971; Rich & Goldhar, 1977). Smith indicates that conflicting findings should be stated, evidence analyzed and explained, and propositions presented. Feldman (1971) suggests that inconsistencies should be resolved logically. Rich and Goldhar (1977) argue that the process of synthesis/transfer is a fundamental consensus seeking activitiy and that consensus should be established

> ...before the knowledge collation, analysis and transformation process is initiated....Knowledge transfer/synthesis should be thought of as a process of innovation...understood to include needs sensing, the collation of knowledge on the basis of these needs (with specific audiences in mind) and the actual transfer of knowledge to the intended audience.
>
> (Rich & Goldhar, 1977)

Thus, it would seem that consensus as perceived by Rich and Goldhar is agreement between the client, or audience, and the persons responsible for the synthesis as to the nature of knowledge to be collated and transferred. Such a view of consensus is not common in the literature on

knowledge synthesis. However, it is common in the literature on linkage, educational change, and dissemination.

The relationship between synthesis/interpretation and dissemination is being raised in current literature, but has not been widely discussed. The activities of organizations engaged in dissemination and/or synthesis/interpretation are not always accurately perceived, and the nature of the two areas is not widely understood. The National Institute of Education defines dissemination as:

- spread: the one-way communication of knowledge in a variety of forms, e.g., materials, ideas;
- exchange: the two-way flow of information relating to needs, problems, and potential solutions;
- choice: the rational consideration of products and processes based on R&D outcomes, and selection of viable alternatives to improve education;
- implementation: the facilitation of adoption, installation, and application of R&D outcomes.

This definition of dissemination (especially in contrast to earlier definitions relating to distribution, public relations, or marketing) relates closely to discussions of knowledge utilization, and to the concept of interpretation. It is probable that those engaged in dissemination and/or synthesis/interpretation need the same knowledge base and attitude or mental set, and similar skills and may use similar processes.

Processes

S/I processes — as presented in the literature — range from the meta-analyses of Medley or Glass, the reiterative conferencing and review of Glaser, or the comprehensive summaries of Suydam, to the oral interchanges of Interlock and Mediphone* or the computer printouts from ERIC

---

* Mediphone is an information network system for medical practitioners. Interlock is a similar system for educational practitioners run by the Regional Exchange of McREL — a part of the R&D Exchange.

via a system such as DIALOG. As our society becomes more complex and the "knowledge explosion" erupts with little indication of surcease, such processes become necessary if information is to be managed effectively. Batty (1976) points out "The natural processes of fission and fusion have had to be abandoned in favor of the artificial process of synthesis, in which relevant elements of constituent areas of knowledge are selected consciously."

Some writers tend to skirt around the synthesis process. For instance, Rich and Goldhar (1977) propose a four step process: problem definition, information production, information use, feedback and evaluation. Or, statements of an advisory nature are made. For instance, Feldman (1971) advocates a balance between the "requirements of completeness or thoroughness...and manageability and readability;" while Reed (1979a) suggests that synthesizers should study various research results and "not just take the first conclusions that we find;" and Platt (1964) points out, "We measure, we define, we compute, we analyze, but we do not exclude. And this is not the way to use our minds most effectively or to make the fastest progress in solving scientific questions."

Attempts to describe synthesis processes tend to fall at either one or another end of a wide scale. For example, there is the extensive description of the process used by Glaser (Glaser, 1978) at one end and the more detailed discussions of particular aspects at the other. For instance, Feldman (1971) discusses five methods used to resolve inconsistencies: "beading together a series of abstracts," counting the "direction of results" in a given subarea, "clustering," using "categories of comparison that combine in a logical way," and "rank-ordering." Both

kinds of descriptions are valuable, and yet both are inadequate from a practical perspective; one because of its focus on a process which may be appropriate only in one context (such as that used by Glaser), and the other because the detail and diversity of particular behaviors obscure the overall process.

Although no single source offers a general model or process of synthesis/interpretation appropriate to the needs of educational practitioners, such a process (albeit incomplete), is suggested by combining pieces of ideas from a variety of sources:

> ...a system of motivation, of intelligence and creativity, or cognitive structure, of perceived relevance of information inputs and uses of information output.
>
> (Nacson & Kane, 1979, quoting Paisley, 1968, who was describing the internal process of knowledge utilization)

> ...the formulation of a framework for the purpose of organizing knowledge...
>
> (Rich & Goldhar, 1977)

> ...an effort to analyze and repackage...information...readily usable by (the) clientele...a manual or...a computer search of all materials on a topic...to summarize and condense...to make judgments about what is of value and what is not...to interpret for school practitioners the implications of research findings for the operation of schools... the practitioner can decide which course of action is warranted.
>
> (Smith, 1977)

"What is needed is a conceptual framework that mutually accommodates models from information sciences, organizational behavior and individual behavior" (Nacson & Kane, 1979). Although the original context for that statement is knowledge utilization, it is equally valid in the context of synthesis/interpretation -- the other side of the same coin.

Product

A synthesis product may be less than a five page document, a published book, or a collection of print and non-print materials. It may look like an annotated bibliography, a matrix, or a discussion paper. It may not look like anything, but rather be an abstract -- consensus reached through oral discussion, such as that used in the synectics process (Gordon, 1973), or an as-yet-to-be-written concept transmitted by telephone. A tight and tidy definition or description of a synthesis product has not been found, although a survey, conducted by the National Institute of Education (NIE) indicated that most syntheses were either "state-of-the-art" papers or "critical reviews," consisting of an aggregation of information on a specific topic derived from one discipline (Rich & Goldhar, 1977).

Rich and Goldhar, advocating a linkage approach to the development and delivery of syntheses, suggest that a synthesis/interpretation package should contain: "collated knowledge (using some media form); names of individuals to be contacted; and a general assessment of available information in the problem area." They also suggest that the end products of the synthesis process should have met the following criteria:

- consensus...between the producers and users...as to the problems that the synthesis product should be addressing...
- appropriate range of data...relevant to the problem...examined for possible inclusion...
- data...of high quality (measured in terms of traditional scientific criteria)
- data...organized in a way that addresses the questions of greatest concern to users...
- support...for the users (e.g., translation of data into understandable language)

(Rich & Goldhar, 1977)

Smith (1977) describes several synthesis/interpretation products developed for or by the ERIC Clearinghouse on Educational Management. Annotated bibliography formats "which vary greatly in style and content" are common. Monographs, 60 to 80 pages long include:

> a brief introduction that defines the topic, an analysis of relevant literature, a synthesis that organizes and integrates the separate strands of knowledge bearing on the topic, and a projection of the future development of the topic.
>
> (Smith, 1977)

The scenario technique is used in a variety of ways to integrate information and/or dramatize and illustrate knowledge utilization or implementation. One state has used the technique to inform and guide participants in a competency based education project (e.g., Project Basic Pilot Design Manual, 1979). In Research Within Reach (Weaver, 1978) scenarios are used to pose a series of composite practitioner questions.

> The scenario is particularly suited to dealing with events taken together -- integrating several aspects of a situation more or less simultaneously.... They force the analyst to deal with details and dynamics that he might easily avoid treating if he restricted himself to abstract considerations.... They can be used as artificial "case histories"...
>
> (Kahn & Weiner, 1967)

Reed (1979b) suggests that synthesis/interpretation (S/I) products can take the following forms: "report, book, resource packet, brochure, slide/tape presentation, chart, research bulletins in a newsletter format." Although their developers do not refer to them as S/I products, resource packets are the most common form developed and shared within an educational system. The organization and contents of such packets vary considerably and there is no readily accessible data on their impact.

Use and Usefulness

While knowledge synthesis is a valuable scholarly activity, evidence suggests that the results of such activity are rarely useful to state and local educators. The scholar often demonstrates integrity through caution -- drawing few conclusions and making few recommendations for action. Practitioners on the other hand, look for clear consensus of research and/or strong directions for action. This dichotomy appears to be recognized in some — but by no means all -- of the literature on synthesis.

Feldman (1971) explains the traditional perspective by arguing that the most obvious use of an "integration is as a compendium...condensing and abstracting existing research; providing bibliographic listings of research and theory." No consideration is given to any kind of user except the peers or colleagues of the person producing the integration. This reflects what Holzner, paraphrasing Max Weber, refers to as the "structured and relatively autonomous domain of scientific inquiry and theory," noting that the "needs and objectives of action involve commitments to other values" (Holzner, 1978).

This gap between research and practice is one of the commonly cited factors contributing to low information use by educational practitioners. Nacson and Kane (1979) discuss five additional problem areas: (1) the knowledge base, (2) the consumer or user of information, (3) the researcher or producers of information, (4) the institutions of higher education, and (5) institutional social and communication systems.

Attempts to change any single variable do not result in increased use of information. The complexity of the educational system and the ways in which its organizational components and individuals interact with each other require equally complex behaviors and systems for the analysis, synthesis, interpretation, and application of relevant information.

> The mounting evidence points clearly to the fact that use of research knowledge by educational decision-makers must occur within a complex, dynamic and often non-rational change process that is affected by competing economic, social and political interests. Similarly, education decisions are not made solely on the basis of scientific information but are also shaped by the realities of the context in which they occur.
>
> (Nacson & Kane, 1979)

The implications of such findings would suggest that much of the "current wisdom" on what "should be done" needs to be examined very carefully -- not from a single perspective such as the "fit" between research and practice, the capabilities of the user, or the kinds of language used by educational writers -- but from multiple perspectives simultaneously.

Summary

The literature reviewed discusses "synthesis" and "interpretive information analysis" but does not consider the combination -- synthesis/interpretation. Also, although collectively the authors cited address several of the factors or processes relating to short-term client-responsive S/I activities, no single document contains a comprehensive description or model for conducting syntheses/interpretations.

The five areas discussed were: assumptions, definitions, processes, products, and use. The assumptions dominating the literature on synthesis

focus on the knowledge base — the content. Definitions present synthesis as an activity which condenses information and resolves conflicting findings, while interpretive products are described as facilitating understanding and use of the information by a particular target audience. Discussions of processes imply the use of critical thinking skills in analysis, selection, and organization of information, and the application of intelligent creativity in the formulation of the framework and development of a synthesis product. The descriptions of products could, to a great extent, be applied to almost any document: only the term "information integration" suggests the element crucial to synthesis. The problems of knowledge use are recognized but not resolved in the literature.

This collection of papers uses synthesis/interpretation -- or S/I — suggesting that the synthesis activity alone may be insufficient for effective knowledge utilization, and that information should not only be drawn together into an integrated whole, but may also need to be interpreted, that is, presented in a form and language readily understood by practitioners. This paper focuses on S/Is produced in response to questions from practitioners, which suggests consideration not only of the content to be synthesized and of the process of interpretation, but also of the client(s) and the context of the request. In order to determine what, if any, differences exist between the practice of "traditional" synthesis and that of quick turn-around synthesis/interpretation in response to practitioners' questions, it is necessary to explore the experience of change agentry and dissemination.

It is hypothesized that although individual mental processes used during the fitting together of information may well be the same in traditional synthesis and in short-term client-responsive S/I, the related processes before and after that integration phase may well be different for the latter case, requiring a keen awareness of such factors as those mentioned by Nacson and Kane.

Those individuals and agencies working on short-term client-responsive synthesis/interpretation activities must deal with these multiple perspectives on a daily basis, as they carry out their tasks of providing relevant information to educational practitioners. The pragmatic perspective of information relevant to a task that must be done is that which influences the remainder of this paper.

A Survey of Synthesis/Interpretation Activities

This section focuses on a survey designed and conducted by the author in the summer of 1979. The section includes: a description of the survey; a discussion of the respondent groups; a summary of responses; and a review.

The Survey -- Design and Use

Recognizing the limitations associated with a mailed survey, it was nevertheless decided that it was the most feasible method for determining just what is being done that might be considered to be a form of synthesis/interpretation responsive to immediate practitioner needs. Following review and revision, 100 copies of the questionnaire and cover letter were sent to

prospective respondents July 18, 1979. Respondents were asked to return the questionnaires by the end of July; in practice, September 30 was the deadline for responses included in the analysis. Information was to be used "to guide and inform" this paper. It was not until the data were analyzed that it became apparent that, rather than weaving survey responses into a "traditional" paper, it could be worthwhile to report the data in a separate section.

The first eight questions of the survey were designed to collect baseline data and were mostly of the "checklist" type with a few inviting/briefly constructed responses (one or two words). The last of these eight questions presented a suggested "scope and sequence" for synthesis/interpretation activity (see Table 1).

Each of the following six questions related to one of the areas of activity presented in the scope and sequence, framing a question of two or three lines and giving a half page for each response. These questions were open-ended, designed to be as clear as possible as to the intent of the question, without being definitive or judgemental. The purpose was to get as detailed a picture as possible of what is actually done. (Table 2 displays these six questions.) The penultimate question invited respondents to volunteer "helpful hints" to those engaged in synthesis/interpretation in response to clients in a hurry. The final question was designed to determine the organization to which the respondent belonged, and invited respondents to indicate if they would like to receive copies of the completed paper.

TABLE 1

SCOPE AND SEQUENCE OF SYNTHESIS/INTERPRETATION
(as presented in the survey questionnaire)

Area	Activities
I.	Identify need/request Conduct preliminary search Clarify request (plus constraints)
II.	Conduct search
III.	Screen and select information Classify/organize information
IV.	Determine construct/framework Fit information and framework
V.	Design S/I product/delivery system Develop S/I
VI.	Deliver

TABLE 2

SIX QUESTIONS TO DETERMINE THE
PROCESSES OF SYNTHESIS/INTERPRETATION
(As presented in the survey questionnaire)

- How do you carry out Area I -- identify need/request, conduct preliminary search, clarify request (plus constraints?) (If you wish, you might list key questions you need answering before proceeding. If you use forms, you might attach copies.)

- How do you carry out Area II -- conduct search? Please refer to manual and automated systems, data bases, human resources. State general availability of above. Refer to constraints or common problems encountered.

- How do you carry out Area III -- screening, selecting, and organizing information? Please refer to: number of people involved in this task area; extent and nature of written (vs. carried in your head) results; major usual constraints or operating principles. How do you decide when to end task Area III and move on to IV?

- How do you carry out Area IV -- determining the construct or framework and "fitting" it with the information? Please refer to extent of creative or divergent thinking behaviors; extent of logical, analytic or linear thinking behaviors.

- How do you carry out Area V -- designing and developing the S/I? Please refer to your major decision-making criteria. If possible/appropriate, please relate your response to that of Question #6 (type of product).

- How do you carry out Area VI -- delivery? To what extent is the delivery essential to the S/I product developed?

The design of the survey and cover letter, and in particular the "scope and sequence" and areas of activity questions displayed in Tables 1 and 2, reflected the experience of staff of the Regional Exchange, Research for Better Schools.

Respondent Groups

Groups that were invited to respond to the questionnaire were, for the most part, those supported by federal and/or state funds, charged with a dissemination responsibility and/or having goals related to effective use of R&D outcomes as well as the provision of educational information. Table 3 lists the groups and numbers of questionnaires mailed and returned. Each of these respondent groups is described below.

- State dissemination capacity projects: support activities of resource coordination, linkage, and leadership within each state, established 1975.
- ERIC clearinghouses: screen and select literature for inclusion in the data base and provide user services and information analysis products, established 1966.
- Research and Development Exchange (RDx): support state dissemination and school improvement efforts by providing information, technical assistance and training via a network of eight (R&D) educational laboratories and a university-based center, established 1977.
- Regional Offices of Educational Programs (ROEP): direct systematic communication on federal programs via dissemination divisions, established 1978.
- Research and Development Utilization Projects (RDU): facilitate school problem-solving using linkage processes via seven projects funded 1976-1979.
- Other: individuals and/or organizations providing information and/or technical assistance services.

TABLE 3

SURVEY RESPONDENTS -- RECEIVING AND RESPONDING TO THE QUESTIONNAIRE

Respondents	Number	
	Mailed	Returned*
State Dissemination Capacity Projects	37	17
ERIC Clearinghouses	16	6
R&D Exchange Members	14	12
Regional Offices of Educational Programs	11	2
R&D Utilization Projects	7	0
Other	15	5
Total	100	42

*One returned with statement that the SEA did not conduct activities of the kind dealt with in the survey.

It should be understood that although all of these groups are in some way responsible for knowledge transfer, the degree to which utilization is an expected (or accountable) outcome varies considerably, and the amount as well as nature of synthesis/interpretation (S/I) activity also varies. When a traditional definition of S/I is used -- thinking in terms of a comprehensive scholarly collection, analysis and reintegration of knowledge on a specific subject -- many respondents would argue that they do not engage in such activity. They more readily describe their kinds of S/I products as review papers, resource packets, sets of materials on specific topics, selective collections, etc. In almost all cases, S/I activity that is client-responsive and quick turnaround is one component of several interactive activities related to information management and dissemination.

Several other general points should also be kept in mind. First, most members of these respondent groups are generalists, rather than content specialists. (Exceptions are most likely to be found in the ERIC clearinghouse group. Also, one RDx respondent and two "other" respondents are content specialists.) Secondly, in addition to group-specific constraints of geography and/or number of clients to be served matched against resources, there appears to be two factors that have a general influence on the kind of S/I product produced and the way in which it is delivered. Both factors may well reflect a general policy of a given agency; the factors relate to response-set and philosophy. The response-set factor is illustrated by the degree to which products and delivery methods are predetermined, ranging from an open situation-specific response-set to a fixed response-set, in which the respondent may have a choice of up to three production/delivery

methods (and often no choice at all). The philosophy factor is illustrated by emphasis being placed on either information or technical assistance -- although both elements are present to some extent in all respondent organizations.

To summarize: 1) overall goals for all respondents are very similar, but accountability for impact varies; 2) few respondents refer to their products as syntheses -- especially in the traditional sense; 3) most respondents are not content experts; 4) each group obviously has its own operating constraints relating to resource allocation; 5) regardless of the group, some response-sets are flexible while others are predetermined; and 6) regardless of the group, production/delivery methods reflect a philosophy emphasizing either information or technical assistance. Preliminary data analysis indicated that, for the purposes of this paper, it would not be productive to report findings by respondent group, especially since the differences that were found occurred across all groups rather than between groups.

Responses to the Survey

As shown in Table 3, 42 questionnaires were returned. One of those questionnaires was not completed, but was accompanied by a statement that the SEA did not engage in S/I activities in response to questions from practitioners. Many of the remaining 41 forms were incomplete in that -- on the average -- at least two questions were omitted. Therefore, the number of responses for each question or area of activity varies. In one case a single response from a state encompassed both the RDU activities and the SEA dissemination activities.

Baseline data. A series of checklist type questions was designed to determine the type of clients served, the range of content areas dealt with, the nature of information synthesized, the forms of S/I products developed, the time spent to respond to a client's request using S/I activities, and the way in which that time was spent. Responses to these six questions are presented in tables 4-9, each of which is briefly discussed.

Responses to the question about client groups are presented in Table 4. The group most frequently served is state department staff (SEA), followed very closely by local (LEA) and school building level staff. (Combining principals, teachers, and other school staff, an average 30 of the 41 respondents provide services to this group.)

Responses to the question on content area indicated that 15 respondents would "prepare syntheses/interpretations in any/all areas or subjects requested" in the educational context. The remaining 20 respondents specified content areas (see Table 5). With the exception of the ERIC respondents and three respondents working in specific content areas, no respondent indicated a restriction to one particular content area (e.g., administration) or curricular subject (e.g., reading).

As indicated in Table 6 the most commonly used information is "current wisdom/R&D state-of-the-art" followed by R&D outcomes and elements of programs and practices. "Current wisdom" includes knowledge based on experience from practitioners and researchers, and emerging or tentative findings or trends indicated by many socio-political factors.

TABLE 4

CLIENT GROUPS SERVED BY SURVEY RESPONDENTS

Client Groups	Responses (N=41)
Teachers	30
Principals	31
Other school staff	29
LEA staff	34
Intermediate Unit staff	24
SEA staff	37
Higher education staff	15
Students (K-12)	5
Students (higher ed.)	10
Other	18
Average number client groups served per respondent	5.5

TABLE 5

CONTENT AREAS SPECIFIED FOR S/Is BY RESPONDENTS*

Content Areas	Responses (N=22)
Curriculum, e.g., mathematics, reading	23
Educational administration, e.g., planning, implementation, evaluation, dissemination	17
Activity areas, e.g., special, bilingual, vocational education	10
General/miscellaneous, e.g., state priorities, school and community	9
Average number content areas specified per respondent	2.7

*Respondents not specifying content areas indicated that they would "prepare syntheses/interpretations in any/all areas or subjects requested" (in the educational context).

TABLE 6

NATURE OF INFORMATION SYNTHESIZED

Nature of Information*	Dealt With (N=41)	Most Usually Dealt With (N=17)
Quantitative data	15	-
Data from test results	9	-
Data from research/evaluation studies	29	4
Qualitative information from research studies	28	4
Current wisdom/R&D state-of-the-art information	32	11
R&D outcomes	27	6
Processes of ...(various topics)	22	4
Elements of programs and practices	32	5
Other (specified by respondent)	3	-
Average number types of information per respondent	4.8	2

*These types of information were presented in checklist format.

In order to determine the forms of S/I products developed by respondents, five forms were suggested in a checklist format and respondents were invited to describe others. As shown in Table 7, 10 additional forms were listed. The data indicate that most S/I products are like literature reviews or annotated bibliographies. Scenarios are not uncommon, and combinations of forms -- perhaps including charts, audio-visual materials and workshop materials -- are also developed.

Turnaround time (as defined in the questionnaire) is:

> The amount of time from when the client makes a request (to you/your system) to the time when the client receives a response (directly related to the request and as complete and relevant as operating constraints permit). Turnaround time includes weekends, holidays, etc.

Four months was arbitrarily set (for the purposes of this paper) as the maximum time for a client-responsive S/I effort. Table 8 displays responses to the question about turnaround time. Respondents were asked to check each column once. The most usual turnaround time for about 48% of the respondents is less than three weeks; 37% take from three weeks to two months; the remaining 15% take from two to four months. In almost all cases, clients can expect some form of response in less than three weeks. It should be borne in mind that a request entering the system from a school usually travels through an intermediary (local linker) before reaching the central respondent, and must return by the same route. Turnaround time includes this "travel" time (phone, mail, in-person -- whatever the method used by the system).

In responding to a question designed to determine the allocation of time, respondents were asked to accept that tasks involved could be

TABLE 7

FORMS OF SYNTHESIS/INTERPRETATION PRODUCTS
DEVELOPED BY RESPONDENTS

Form of Product	Used (N=41)	Most Used (N=27)
*Annotated bibliography	35	7
*Matrix	5	-
*Chart/graph/table	8	-
*Narrative (like a literature review)	35	10
*Narrative (like a scenario)	12	4
Narrative (like an abstract)	4	2
Narrative (like a report/review)	4	2
Audio-visual materials	11	-
Computer printout	4	1
Micro-fiche	2	-
Lists of agencies/contacts	2	-
Oral report	2	1
Survey results	1	-
Workshop materials	6	-
Combination of forms	6	3
Average number forms per respondent	3.3	1.1

*These items were presented in checklist form.

TABLE 8

TURNAROUND TIME

Time	Shortest (N=35)	Most Usual (N=40)	Longest (N=36)
Under 5 days	20	5	-
5-10 days	8	10	2
11-20 days	2	4	5
21-30 days	1	6	8
31-40 days	2	4	2
41-60 days	-	5	2
61-80 days	-	1	5
up to 4 months	2	5	12

classified as "technical, professional or clerical." Terms were defined as follows:

> Technical = time spent on search and retrieval tasks, use of computers, etc.
> Professional = time spent on clarification, negotiation, knowledge building, interpretation, translation, analysis, synthesis, design, writing, etc. (If consultants/reviewers are involved, their time is included in this group.)
> Clerical = time spent on typing (or otherwise producing) material and other routine tasks.

This questionnaire item required a constructed response -- number of person days -- for each of the three tasks. Responses are summarized in Table 9 -- Allocation of Time by Type of Task. In the majority of cases, less than three days is spent on technical tasks, with six of the 32 respondents spending less than one hour. Respondents vary more for professional tasks, with approximately half the respondents spending less than five person-days on this range of activities. The majority of respondents indicate that clerical tasks are accomplished in one day or less, and it appears to be rare for more than 10 days to be spent. The data indicate that average amounts of time allocated are: Technical -- 3.7 person days; Professional -- 7.9 person days; Clerical -- 4.4 person days. It should be noted that several respondents indicated that responses to this question were "best estimates."

Scope and Sequence. A general scope and sequence of six activity areas was presented (see Table 1). Respondents were asked either to indicate that the scope and sequence was generally acceptable, or to suggest alternatives. The majority of respondents (26) agreed to the scope and sequence. Of the remaining 15 respondents, two suggested different scope

TABLE 9

ALLOCATION OF TIME BY TYPE OF TASK

Amount of Time	Type of Task		
	Technical (N=32)	Professional (N=34)	Clerical (N=34)
Up to 1 hour	6	4	4
Up to 1 day	7	4	12
1-3 days	9	8	5
4-5 days	5	3	8
6-8 days	1	1	3
10 days	3	5	2
12 days	1	3	-
15-20 days	1	5	-
25-40 days	-	2	1

and sequence lists; four accepted the scope but argued that the activity areas were not sequential but could be interactive (especially III, IV, and V), or cyclical; four inserted review and/or revision activities after Areas III and/or V; two added evaluation of impact after Area VI; and four commented on the nature or sequence of tasks within an activity area. One of the alternatives suggested was: 1) identify need, 2) determine the construct or framework, 3) conduct the search, 4) screen/select/organize the information, 5) write the S/I, 6) deliver. The other alternative suggested that the process consists of two cycles of behavior, one cycle being observable (need, commitment, search, delivery) and the other being internal to the synthesizer (reflect, consider sources, report, review). The internal cycle is repeated for each phase of the external or observable cycle.

Regardless of the extent of agreement to the scope and sequence presented in the questionnaire, respondents were asked to respond to each of the subsequent area-specific questions as given. Also, for each of those questions, respondents were asked to think in terms of their "most usual" behaviors for quick turnaround S/I activities. Each of these six questions required a constructed response. Some respondents wrote as few as five words in response to each question; some wrote lengthy paragraphs of 200 words or more; most wrote two or three sentences for each question. Table 2 presents the questions in full as given in the questionnaire. Abbreviated forms are used in the review of responses that follows.

Area I — identification and clarification of need/request. There were 40 responses to this question. Statements fell into three general categories: 1) method of need identification, 2) questions for clarification of the request, and 3) behaviors to facilitate Area I activities. The "message" most frequently emphasized was that the success of all subsequent activities is dependent upon this one, and therefore, it is essential that the client and the searcher/negotiator/linker have a shared understanding of the overall task before Area II activities are begun. A second "message" inferred from the data was that the terms "need," "problem" and "task" used in reference to the client's request, are defined differently by different respondents and reflect a respondent's philosophy and actions.

Respondents reported two methods of need identification: by direct client request and by needs assessment. Eight respondents use both methods; six use needs assessment only; and 26 referred only to the direct client request method. The commonly used term for the development of an S/I in response to a needs assessment is "hot topic." Of the 14 respondents working on hot topics, only one identifies the need through a formal survey. The most common technique reported is the analysis of incoming requests. Other fairly common techniques reported are: general analysis of educational trends and state priorities, and responsiveness to the suggestions of an advisory board. Several respondents have some form of verification for a hot topic, usually through local linkers or by telephone interviews with potential users. (Responses to subsequent questions rarely distinguished between behaviors in response to direct requests vs. relating to hot topics.)

All respondents listed key questions to be answered before moving on to Area II activities. Seven respondents attached copies of forms to be completed by clients. Table 10 -- Clarification Questions -- lists the questions suggested and the number of respondents advocating each question. The last question on the table summarizes most of the others: What are the general parameters of the situation -- client, content, context? Questions and answers may or may not be written, but -- as stated earlier -- both the client and the synthesizer should be able to give the same answers to the questions. As several respondents point out, this is not as easy or as obvious as it may appear, but the effort is worthwhile in the long run.

The third category of responses in this area relates to facilitating behaviors. Five strategies were suggested for preliminary searches to get a general idea of the scope of the content or task (presented in order of frequency of response): 1) contact informal network (by phone); 2) "dip-stick" manual search of indexes, recent newsletters, reports and journals; 3) run a computer search; 4) identify content experts; and 5) review the literature. Two strategies were suggested to ensure a clear statement or understanding of the overall task: 1) design and conduct systematic pre-training in problem definition, etc. for school teams so that incoming requests are on target; and 2) have the client present during the preliminary search -- manual or on-line. Six respondents stated that a discussion with the client was desirable before moving on to Area II, partly to review the boundaries of the overall task and partly to make sure that the client and the synthesizer are still on the same track.

TABLE 10

CLARIFICATION QUESTIONS

Questions	Responses (N = 41)
*What is the need, problem, or task?	17
*Why is information needed/how will it be used?	14
*Who needs the information?	13
Who is likely to use the information?	4
*Who is the ultimate target population (e.g., grade level if students)	7
How does task/topic relate to current priorities (client/state)?	5
*What does the client know already?	7
What else is client doing to get information?	7
*What level/degree of information is needed?	9
*What time span (recency of materials) does client want?	4
What are best forms of information for client use?	6
What forms are available to me?	8
*When does client need the information?	10
When is information likely to be used?	5
How quickly am I likely to get information?	4
What is the best delivery method?	1
What is the best feedback method?	1
*What descriptors does client suggest for search?	2
*How much money will the client spend?	2
*What are the general parameters of the situation--client, content, context?	6
Average number of questions per respondent	3.2

*Questions included on forms completed by clients as part of Area I activities.

Area II -- search and retrieval. Responses to this question were categorized as methods, resources and problems. The search methods are summarized in Table 11; a combination of on-line, manual and human resource methods is most common.

Specific resources (data bases) tapped fall into five groups: computer systems, indexes, libraries, files, and human resources. (In one state all information tapped to respond to clients' requests is accessible by computer, including a variety of files such as promising practices, service agencies and human resources.) The most commonly used computer system is DIALOG; all systems tap ERIC. Indexes most frequently cited are RIE, CIJE and Psych. Abstracts. Approximately 33% of the respondents use professional library or in-house resource center services. Files referred to include: promising practices, NDN materials, curriculum materials, files "built" for hot topics and/or state priorities, commercial materials and Title IVC programs. Table 12 -- Human Resources as Sources of Information -- lists seven categories of human resources tapped by 27 respondents. The term "talent bank" is used to indicate access to specific individuals and agencies described in a systematic human resource file. Of the 13 respondents tapping a talent bank, seven check the file and six may also telephone people listed. The other categories listed are usually contacted by telephone or in person.

Ten respondents described a total of 28 specific problems relating to search and retrieval activities. They are summarized here: 1) time -- especially the time it takes to acquire hard copy materials for the S/I

TABLE 11

SEARCH METHODS

Methods	Responses (N = 39)
Computer search only	4
Standard manual search only	-
Human resources only	-
Computer + manual	7
Computer + human resources	2
Manual + human resources	5
Computer + manual + human resources	20
Via third party information service agency	1

TABLE 12

HUMAN RESOURCES AS INFORMATION SOURCES

Human Resources	Responses (N=27)
Talent bank	13
Colleagues/network	9
RDx, R&D labs and centers	8
SEA content experts	7
Own expertise	4
Federal agencies	3
Advisory panel	2
Average number sources per respondent	1.8

task given the pressures of other priorities; 2) information -- too much, too little, inappropriate form for the client's need, the difficulty of obtaining fugitive documents especially those produced by SEAs; 3) ERIC -- lack of "fit" between need and descriptors, time for EDRS to provide hard copy; 4) money -- amount client is willing to pay and cost to respondent (e.g., $20 for 50 abstracts); 5) vagueness of client request; 6) credibility, if the synthesizer uses too much information from the "invisible college" without back-up documentation; and 7) difficulty in evaluating information when the searcher is not a content specialist.

Area III -- selection and organization. There were two clear messages in the responses to this question: 1) when the client is in a hurry the criterion of relevance is more important than comprehensivenss, and 2) one person takes on almost all the work, which means that behaviors are -- to a large extent -- idiosyncratic. Responses fall into four major categories: the people involved; the behaviors/activities practiced; criteria used in screening information; and criteria used to determine when to move on to Area IV. (Tables 13-15 summarize responses in these categories.)

Table 13 presents two lists of people involved in Area III activities. The first list indicates the person or group responsible for doing the work. The second list indicates individuals or groups who may be consulted in some way or another. Of the 37 respondents, 22 report that one person is responsible for carrying out Area III tasks. The term "information linker" is used to describe a person usually perceived as a generalist, with skills

TABLE 13

PEOPLE INVOLVED IN AREA III ACTIVITIES
(SCREEN/ORGANIZE)

People Involved	Responses
Carrying Out Area III Tasks	(N=37)
Me (individual responding to survey)	15
Information linker	3
Content linker	4
Information linker and content linker	2
Information linker and content linker and R&D marketing person	1
A small team	6
Responsibilities not clearly specified	6
Providing Input, Review	(N=16)
Technical: librarian, writer, editor	3
Client relevance: client, local linker	7
Content: content expert, advisory panel, colleagues	15

in information management. The term "content linker" is used to describe a person knowledgeable in the particular subject area of the client's request who is not necessarily on the staff of the information service, but who is usually employed by the same "parent" agency. Sixteen respondents stated that one or more other groups were involved for review or consultation. In all cases, respondents stated or implied that appropriate revision follows review.

Respondents select and organize information in three ways: 1) automatically, 2) traditionally, and 3) innovatively. Excluding the group relying on automated systems (using series of descriptors fed into a terminal to reduce the knowledge base to be read) Table 14 summarizes the major Area III activities as mentioned by 28 respondents.

Thirteen respondents listed criteria for content inclusion. These criteria are presented in Table 15. The most commonly used criterion is the client's need or the proposed purpose or use of the information. Relevancy, recency and the type of content or nature of the information are also used more often than other criteria.

Nine respondents listed criteria for concluding selection and organization activities and moving on the Area IV. Criteria included: time; cohesiveness, completeness, and repetition of the information reviewed; and sense of relatedness among components. Apart from the pressure of time, criteria listed seem to indicate that the synthesizer reaches a point at which the information accessed "relates to all its parts and the client need. . .When it becomes repetitive, I know I have a good general grasp of the topic." It should be noted that four respondents argue that Areas III and IV are interactive.

TABLE 14

MAJOR ACTIVITIES PRACTICED IN
SELECTING AND ORGANIZING INFORMATION

Activity	Responses (N=21)
Collect a mass of information, especially abstracts and relevant hard copy	5
Scan everything	8
Find additional information, especially that which is contrary to that on file	3
Carry all information "in your head"	7
Make notes, e.g., on abstracts on cards by sub-topic, by selecting/highlighting key quotations	10
Organize information, by logical categories, grouping note cards or cutting/pasting from bibliographies	10
Conduct systematic analysis of content in client/context, "juggling" in mental matrix	2
Review (information and client need)	5

TABLE 15

CRITERIA FOR CONTENT INCLUSION

Criteria	Responses (N=13)
Client need/task/purpose	7
Type of client	1
Quantity of information client wants	1
Money available	1
Type of content	2
Information that:	
-is recent	2
-is relevant	2
-is readable	1
-is high quality	1
-has substance	1
-gives historical background of topic	1
-relates to primary concerns/issues of topic	1
Aim for no more than 13 items	1
Average number of criteria per respondent	1.7

Area IV -- fit of information and framework. This question drew the widest range of responses, including 14 categorized "off target" (e.g., "precedes search," "this is difficult to answer"). Of the 21 "on target" respondents, twelve described logical behaviors, five described a mixed set of activities, and three made advisory comments. Advisory comments were also made by one of the "logical" respondents.

Quotations are used from each of the twelve logical respondents and built into a scenario:

> Immersed in the topic, I gradually determine an outline. Since I'm not usually an expert in whatever I'm writing about, I try to be logical and matter of fact, and depend on consultants for interpretive work. I review the need, the information and how it is to be used, make sure the information is adequate, and organize it into logical sections. There's a high degree of analytic thinking to discern relationships among pieces of data. Both linear and divergent thinking are required to synthesize and communicate effectively. I sometimes use "main source" order, beginning with the base work, or I'll do state-of-the-art studies, with documents presented more or less in chronological order. I'm aiming for a logical integration. The content often determines the construct.

The six "mixed" responses may best be summarized by this statement from one of the respondents, "The framework is a "confluence" among the client's purposes, the information, and the synthesizer's style -- his or her habits in organizing information..." Another respondent in this group argues that there must be a balance of forces "for the structure-system-design-construct to have integrity and stability." The respondent imagines a sphere "in which forces of tension and compression are balanced in an open structure, which is resilient and increases in strength as it increases in size." A third respondent states that the "framework is suggested by the inherent structure of the content and the task facing the client," and

argues that "what the information suggests needs to be determined and made manifest." A fourth respondent conceptualizes two alternative models -- "one minimally meeting the client's need and one more than meeting the need" -- and then "tries them out mentally" to simulate impact. A fifth, beginning by emphasizing logic, goes on to state that other factors also play a part, such as personal preference or style, inspiration and the desire to experiment. The sixth respondent in this group argues that Area III is analytical, Area IV is creative, and a period of incubation is necessary between the two areas of activity. The respondent

> ...works on something else, preferably...materials/ideas from other fields. What seems to happen is that analogies "bubble up," scenarios of my clients, the information and various processes play through my mind in much the same way as in thinking through a story (fiction) I might be writing....When the framework surfaces, it is "right" for the content: it has its own elegance. This framwork must take into account the content, the client/context as well as some process by which the content can be transmitted.

All six of the respondents in the "mixed" group state or imply that the strongest factor influencing this area of activity is the client's need, task or purpose.

Two of the four general or advisory comments also related to the client. One suggested that a draft of the S/I product should be "tried out on a group of prospective clients" and revised in accordance with their "thoughts and needs." Another stated that most clients are unwilling to pay for "tailoring of materials....They want the service but not the cost." A third "respondent" stated that their three-member team includes two divergent thinkers and one linear thinker "with enough divergent thinking behavior to make her tolerable." The last statement in this set indicated that the

respondent usually adapts existing frameworks "often sacrificing detail to the need for a generally correct framework."

Area V -- design and development of the S/I product and delivery system. Responses to this question fell into four categories: the nature of the product, criteria for the design and development of the S/I, behaviors or activities, and advisory comments. Almost all statements reflected a concern with a material product ("paper with print on it") that could stand alone; a few discussed strategies for delivery or the interaction between product, delivery process, the information service agency, the client, and utilization of the information synthesized.

The question suggested that respondents could refer to the earlier checklist question relating to products (see Table 7). Ten of the 28 respondents described their most usual form of S/I product. Seven respondents described a product containing two or more components, such as an annotated bibliography plus a review paper, or a categorized bibliography plus one or two key publications plus a targeted paper. Of the three single component products, one was a computer printout, one a targeted paper and one a "5-10 page narrative." Only one respondent mentioned "people to contact," and another mentioned "workshop materials." Almost all products described were print materials, with various kinds of annotated bibliographies and brief review papers being the forms most frequently described.

Criteria for the design and development of the S/I product were given by 13 respondents (see Table 16). Of the 41 responses made, 25 related in some way to the client, six related to the content, nine related to the operating constraints of the synthesizer, and one related to context and coordination.

TABLE 16

CRITERIA FOR DESIGN/DEVELOPMENT OF S/I

Criteria	Responses (N=13)
Client-related	
-client purpose/intended use	6
-nature of client task/need	7
-type of client	4
-nature of probable interaction -- client and information (e.g., known disposition of resistance, time available for review before use)	4
-nature and extent of client's existing information and resources/methods for dealing with various forms	4
Content related	
-nature of information	5
-amount of information to transmit	1
Synthesizer's constraints	
-nature of search strategy used	1
-time	5
-money	2
-feasibility	1
Potential for coordinating/collaborative activities (at client site, across hierarchies or divisions, re federal or state priorities)	1
Average number criteria stated per respondent	3.1

Eight respondents made some kind of statement relating to specific behaviors in this area such as inviting a content expert to assist in the design and subsequent delivery. Five indicated that the method or system is predetermined, following a standard logical pattern.

Seven respondents made advisory comments. Of the 10 comments, six advised the writer, as paraphrased here:

> Include different kinds of information -- research, policy, structured opinion — using concrete examples at the client's level of operation and recognizing that an informal style can often be useful. Somehow inform the client of your bias or perspective, but make sure that the S/I product as a whole is objective -- perhaps by including information new to you or contrary to your initial view of the topic. Always credit your sources.

Two respondents referred to a review process at this point, one advocating an external consultant review of the product followed by revision before delivery, and the other suggesting that the client must approve the outline before the product is developed. Three respondents suggested that delivery is crucial and should be designed so that some kind of follow-up occurs e.g., by involvement at this stage of the local linker, who subsequently provides technical assistance to the client.

Area VI -- delivery. The general consensus among respondents was that in-person delivery of the S/I product is most desirable, but that information is mailed when face-to-face discussion is not feasible. As stated earlier, one state has an electronic network through which information can be shared by all districts, resource centers and the SEA. With one exception, the eight respondents stating that a workshop or small group is the delivery method, indicate that the S/I product and the mode of delivery

TABLE 17

METHODS OF DELIVERY

Method	Responses (N=32)
In person (e.g., state/local linker)	23
Mass mail, newsletters, other "standard" systems	20
Direct mail	16
Workshop, small (task) group setting	8
Phone	6
Computer system/electronic network	1
Average number methods per respondent	2.3

are directly related to each other and to the client's preference. Four of those respondents indicate that the oral interchange (especially simulations of application of the information and exploration of alternatives and consequences), is an essential part of the synthesis/interpretation.

Table 18 summarizes advisory comments made by eleven respondents, which imply that the interpretation aspect of S/I might best be a part of delivery. In addition, four respondents described perceived barriers. Two indicated that it is a waste of time to develop an S/I product without having a good plan for its delivery and knowing how it might be used. One stated that his/her organization has no systematic method of promoting S/I products for use by anyone other than the original client. One stated that his/her organization does not have the authority to require anything (such as specific delivery processes) of those who deliver the product.

Helpful hints. Responses fell into four categories: resources, identification/clarification of need, time management, and the product. Four of the 27 respondents stated that they needed help or advice.

The first response category relates to resources. One respondent stated that although the initial cost of a statewide electronic network was expensive, it is likely to be long-term cost-effective. Two others argued that in order to be able to develop syntheses/interpretations, it is essential to have an extensive well-understood resource base on hand, and to keep it up to date. One of these respondents stated that his/her agency had spent time and energy building such a resource base in specified areas of high interest/concern to practitioners. The remaining

TABLE 18

COMMENTS ON DELIVERY

Comments	Responses (N=11)
Arrange for follow-up activities	3
Availability of consultative assistance (content linker) is crucial	1
In person delivery allows for explanation of all activity areas, problems, successes, selection criteria, nature of product and potential for use, and can enhance credibility of delivery agency or person	5
Explore opportunities for involvement of other client units, or other dissemination groups, and ways to use what already exists at client site	1
Deliver at point of client "need to know"	1
Design delivery and product to allow for active client interaction/simulation of use of information	2
Mail brief overview or general advance reading prior to face to face delivery of balance of information	2
Average number of comments per respondent	1.5

comments related to human resources -- the skills and knowledge of the staff carrying out the S/I -- specifically, a strong practitioner orientation, the ability to write well within given time constraints, critical thinking skills to analyze information logically and without bias, and creative thinking skills especially for the integration and design activities. Several respondents stated or implied that good generalists have these capabilities, and, unlike content specialists, are less likely to favor one particular approach in a given field.

Ten respondents stressed the importance of identifying and clarifying the client's need -- what is often referred to as search negotiation. Their comments are paraphrased below.

> All other activities, and -- most importantly -- the client's satisfaction, are dependent upon effective search negotiation, so it's worth taking the time and effort to clarify exactly what is needed, preferably by speaking directly with the client. Strive for mutual clarification: the client must clarify the problem or task (in his/her own mind); you must be able to elicit that information; you and the client must share the same understanding of the task. Either know the client well enough to be sure you're on target throughout the process, or maintain frequent/on-going contact with the client. As you progress through the process, remember that only the received information matters to the client.

Five respondents made a total of 13 comments about time management. Two comments related to advance planning, suggesting that needs should be determined in advance (e.g., needs assessment for hot topics), and that files of S/I products on priority topics should be maintained and tapped as needed. One respondent pointed out that his/her organization produces 20-25 S/I products each year and tries to deal with topics of highest value or need. The remaining nine comments are paraphrased below.

> Recognize that every stage or activity area is time-consuming, be aware of your resources and work habits so that — given the client's deadline -- you can plan your tasks accordingly. Use the telephone instead of the mail; consider using a set of several short-format items, rather than a single long review paper; transmit fewer, but on target messages. Buy time by giving some information almost immediately, get client feedback (by phone), and continue with process.

Five respondents discussed the S/I product; their comments are paraphrased here.

> If a synthesis exists, use it as is -- your client may be just as able as you to read it and apply the information. If you're in a hurry, write an annotated bibliography, with an introduction dealing with relationships — it's quicker than a review paper and is almost always adequate. Use variety of form and/or format within a synthesis set, so as to appeal to and be understood by different learner types in the client group. Make sure that the product satisfies the criteria of: relevancy, quality, recency, brevity, plain language, clear display headings and an open format.

The majority of responses to the request for helpful hints were classified as process-related. Recommendations related to quality, style, and knowledge access; they are paraphrased below:

> Write well and in a language and format appropriate for the client. Use good judgment in determining appropriate level of specificity, and in deciding what to include or exclude. For instance, show how the client's expertise can fit with the S/I rather than being duplicated. Know how to tap knowledge bases (material and human) quickly and efficiently, and help the client to gain similar expertise, especially as a back-up to the S/I.

Review

In spite of the fact that the scope and sequence of activities presented in Table 1 were challenged by some respondents, in general terms, the areas of activity represent an acceptable descriptive framework for the majority of respondents. Those areas are: I — identification and

clarification of the need/request; II -- search and retrieval of information; III -- selection and organization of information; IV -- fit of information and framework; V -- design and development of the S/I product and delivery system; and VI -- delivery. Review and revision activities may occur within any area and probably should be built into all, except Areas I and VI, rather than be treated as a separate area.

Follow-up activities for in-depth second round technical assistance or evaluation may well be appropriate and desirable but are not necessarily considered part of the synthesis/interpretation process. Delivery may be perceived as an opportunity for technical assistance within the constraints of a short turnaround time. Additional technical assistance is either a follow-up or, in some cases, could be a completely new set of activities carried out by persons other than the developers of the S/I. Although, in an ideal situation, a respondent could progress through the six areas of activity in a linear sequence, it is the opinion of this author that "looping" can and does occur, and the sequence and extent of looping is situation-specific.

The three areas most critical to the actual synthesis are III, IV, and V -- analysis, integration, and design. Area III, the analysis phase of the S/I process, is perceived as complex and highly demanding since the synthesizer -- rarely a content expert -- works under the conflicting pressures of time and a mass of information. Determining the framework and how the information fits the framework is the integration or creative phase of the S/I process. Of all the questions posed, this one -- relating to Area IV -- seemed to be the most difficult for respondents to

answer. One respondent probably represented the reactions of many when he/she wrote, "I'm afraid I haven't been introspective enough to answer this question very completely." Responses in this area and in Area V seemed to suggest a dilemma with client/context relevance on one hand and the academic tradition for comprehensiveness on the other. The criteria listed for the development of S/I products (Area V) implied action for client/content relevance, but many of the products described related more to the academic tradition -- if not in comprehensiveness, certainly in form. General criteria for short-term client-responsive S/Is are presented in Table 19.

The richness and quantity of responses to the questionnaire indicated that respondents involved in the process are concerned with ideas for improvement and -- in several instances -- critically aware of their own activities. They would almost certainly answer the question, "Why?" with the response, "To improve schools -- what happens in the classroom -- how and what the students learn."

If it is agreed that is the purpose in developing syntheses/interpretations, how can what is being done be improved? Respondents can learn from each other by examining the survey results presented in this section of the paper. Perhaps we can also learn from some of the ideas presented in the next section of this paper.

TABLE 19

CRITERIA FOR SHORT-TERM CLIENT-RESPONSIVE S/Is

Criteria*
Consensus between client and synthesizer as to the problem addressed
Appropriate range of data examined by synthesizer
Data of high quality used
Data organized to address client's priorities
Support (e.g., use of appropriate language) for the client
Inclusion of a variety of data
Objective and honest presentation of data
Logical coherent integration of data

*The first five criteria are suggested by Rich and Goldhar (1977) and supported by survey data. The last three criteria are drawn from the survey data.

Elaboration on the Survey Results

This section of the paper consists of interview data from selected survey respondents and structured opinion. Discussion does not repeat information from previous sections, but elaborates upon it and attempts to identify feasible and desirable alternatives for action in those areas creating the most problems for respondents.

The Areas of Activity

Area I -- identification and clarification of need. The use of "need," "problem," or "task" is not simply a semantic difference, but is philosophical, political, and action-oriented. Below is one example played three ways.

It is not uncommon for reading achievement scores to go down between 4th and 8th grade. The junior high school principal is frequently expected to take some appropriate action. If he contacts an information service for assistance he could say:

"I need a new reading program."

"My problem is that content area teachers don't teach reading."

"My task is to improve student achievement in reading."

His need is really a want; his problem is a complaint; both are in a sense answers rather than requests. He may in fact need a new program or some form of inservice for reading in the content areas, but it is also possible that he needs to adjust schedules, relate his courses more closely to those of the elementary school, address issues of discipline

or parent involvement, or any number of things. The task statement is probably the best beginning -- both from the point of view of potential benefit to students and from the point of view of the information linker. It does not matter which term is used as long as the result is not "wants" or "complaints:" it is more useful to work with task statements or challenges, and most useful to have a complete understanding of the task situation, the overall context, and the client.

To be effective in this area linkers can learn from problem-solving techniques, particularly those used by Parnes (1967) and by Synectics, Inc. (e.g., Gordon, 1973) to define complex problems. One survey respondent reported on a pretraining program for teams of school staff. For a week -- away from the school environment -- teams are trained in problem-solving processes, using the techniques on both behavioral problems (e.g., cross hierarchy communication) and technical problems (e.g., curriculum improvement in mathematics). In other organizations the information service staff and/or state and local linkers receive some form of training in problem-solving and/or search negotiation. It would seem desirable to have systematic training of this kind, for both the potential clients and those providing information. It is feasible using turnkey training and long-term planning.

A word of caution: if the linker determines the need, automatically excluding some alternatives, he/she does so at the risk of being unresponsive to the client's task. The boundaries agreed upon at the end of Area I must be broad enough to encompass several viable alternatives

and narrow enough to be task-relevant and feasible given a short turnaround time. If indeed, after thorough discussion, the principal does need a new reading program (set of curriculum materials), subsequent activities do not necessarily result in a synthesis/interpretation.

A second point of importance in this area relates to the preliminary search. If the linker knows very little about the content he/she should not initiate a major search, nor close search negotiations without getting a general idea of the potential scope of the task. One survey respondent argued that if the request is clarified properly by a skilled negotiator a preliminary search is unnecessary, and that may well be true in some cases. However, faced with new or broad content areas, it is probable that many linkers (generalists) would hesitate to reach agreement on the boundaries of the task without some kind of preliminary exploration of the topic.

Area II -- search and retrieval of information. Although the sum of responses indicates that searches are conducted thoroughly and efficiently, specific responses suggest ideas for improvement -- through networking and collaboration.

Each individual, each organization, and each respondent group has its own informal network, or "invisible college." Networks cannot be successfully formalized nor shared, but contacts can be accessed within and among groups through collaborative effort. Two important elements of successful networking are trust and equal exchange. Contact points become disconnected if trust is abused (e.g., information misused, or

source not credited) and/or if the give and take between two contact points is unequal. Contacts are usually oral, informal, and include discussion of key references, current work in progress, and individuals or agencies interested in the same topic. Effective linkers maintain contacts across all levels of the educational hierarchy.

When networking is combined with collaboration between information service agencies positive results can be achieved quickly. The agency first contacted coordinates the activities, but each other agency can work independently and retain a sense of ownership to some extent. Thus, a state capacity project could receive a request, initiate a computer and special file search, invite the SEA content specialist to participate or help, and make three key phone calls -- to a university or college, to an ERIC clearinghouse or federal agency with information in the content area, and to the Regional Exchange. Each of the three telephone contacts is likely to tap different networks. The state linker makes sure that all involved know about the others so that as little duplication as possible occurs.

Area III -- selection and organization of information. In a traditional synthesis, analysis should be absolutely thorough; in a client-responsive synthesis, analysis could be general -- less detailed, gross cut rather than finely carved. Just how much information is screened and the extent of analysis is determined by the two pressure points of information mass and time available.

Survey results identified three behavioral patterns for dealing with a mass of information: automatic, traditional, and innovative. There are advantages and disadvantages to each, and -- if it is feasible -- it might be desirable to use all three.

The automatic pattern relies heavily on the computer, reducing the data through the use of descriptors and criteria. The main advantage is speed; the main disadvantage is that only one perspective is used -- it is unlikely that information from other disciplines will be tapped.

In the traditional behavior pattern the linker uses the library (but not necessarily the librarian's expertise), and insists on hard copy materials and a systematic method of notetaking. The main advantage is thoroughness; the main disadvantage is the time-consuming nature of this approach if the results are to be useful to the client.

Innovative behavioral patterns are situation-specific and idiosyncratic. Materials are "scanned" rather than "read;" information is carried in the linker's head rather than on note cards. The main advantage is the inclusion of a variety of types of information or perspectives; the main disadvantage is the probability of inaccuracy or incompleteness when the information is integrated.

Since in so many cases a single individual is responsible for most of the work throughout the process, the knowledge, skills, and dispositions of that person will determine to a large extent not only the behaviors for screening and organizing information but also the nature of the results of the whole process. Training can provide linkers with

awareness of alternatives, and peer and expert review may be helpful methods of quality control, but individual characteristics are probably the strongest influence in determining whether behaviors are predominantly automatic, traditional, or innovative.

Time management can be difficult. It is not desirable to stop Area III activities when "time runs out," just as it is not always feasible to stop when the linker has "finished reading." Data emerging from some recent studies indicate that it takes twice as long for a school team to define a problem fully as it does to work out a solution. In the synthesis process, the problem is not fully defined until the end of Area III -- when the linker understands the client, the context, and the content. It is probable that, for a three week turnaround time, most linkers need the first two weeks to identify the need, conduct the search, and screen and organize the information -- i.e., define the problem fully. In the last week, the linker works to design and develop the S/I, putting it into the mail or delivering it in person just in time to meet the deadline. If that is the case, the linker can plot the turnaround time so that Area III activities are completed two thirds of the way through.

This requires high intensity work habits and a high degree of certainty about the client and the overall context of the task. Relevance is the key criterion, but what is relevant to one client may be irrelevant to another. Even if both have the same task, one may have a different existing knowledge base than the other; they could be working from different perspectives or they could be from different levels of the educational

hierarchy. As one respondent pointed out, if the client is a teacher, the synthesizer should think like a teacher.

Assuming that the linker knows what is likely to be relevant, can manage time fairly well, has kept the mass of information to a minimum, and has some system (as suggested in Table 14) of reviewing and recalling the information, there is still the question of the point of conclusion. Subjectively "the components begin to gel." Formally linkers ask for assistance from content experts. Yet, since they know they do not have the comprehensiveness of traditional syntheses, they feel the need for some assurance that they have enough appropriate information to begin to develop a synthesis/interpretation. Repetition, completeness, and cohesion were listed as useful criteria, by survey respondents. Repetition is used as a criterion by communication experts collecting data, using an unstructured interview technique. When the information scanned repeats itself, no further reading is done on that particular aspect. The document that deals with it most thoroughly is selected, and others set aside. Completeness relates to range rather than depth. In the principal's example used earlier, the linker would want information on any factor that could feasibly be changed in that school and that could provide a solution to the reading problem (e.g., curriculum, student motivation, schedules and management systems). The range for a given S/I can be determined partly by what the client believes to be feasible and desirable, partly by the socio-political context of the topic (including the linker's degree of entitlement) and partly by the opinions of experts. Cohesion is more

subjectively measured. If the linker reviews the information, considers tentative categories, and recalls key arguments, the whole should be cohesive -- the flexible sphere mentioned by one of the respondents. If one category has no relationship to the others, or if some information sticks out, the sphere is more like a hand grenade with a loose pin. Then the linker must either re-examine the information on hand, or collect more.

Area IV. What happens at this point probably determines whether the client receives a useful collection of related pieces of information, a synthesis, or a prescription. If the information is drawn together, if it is integrated in such a way that the client can perceive relationships between the pieces collected, there is a synthesis. A computer printout of 15 on-target ERIC abstracts by itself is not a synthesis. However, if it is accompanied by some form of construct -- narrative or diagramatic -- that takes elements common to the content of the documents and shows how they relate to each other and to the client's task it might well be a synthesis. Or if the printout is presented in person by a content specialist, who provides on-site interpretation and consultation as the mode of delivery, that might be an S/I. All eight of the criteria listed in Table 19 need to be satisfied. On the other hand, if the contents of those 15 documents are analyzed, categorized, reduced according to the client's operating constraints, and compromised by extensive consensus, the range of alternatives could probably be brought to a point of regression to the mean and the result would be a prescription. A prescription may be the ultimate S/I, but is definitely not desirable.

A review of the survey data in this area indicates that although linkers try to keep the client/context in mind, in most cases the content determines the framework to be used. The data suggest that logical categories are found in the information and those categories are used as the basis for a framework. Common or traditional frameworks include: main source or chronological order of documents reviewed; a historical summary leading to current issues; a debate format for each of the key issues; a series of questions and answers; and a series of propositions, each followed by appropriate discussion (Reed, 1979b). Other less common frameworks include: discussion of perspectives -- federal, state, local, or parent, student, teacher; review of programs by the key components of management, assessment, and instruction; organization by "rules" of writing such as the tactic of pyramid writing or the journalistic tradition of who, what, when, where, how, and why?

These may be considered as frameworks of format and are commonly used for stand-alone syntheses that are printed products that clients can make sense of without in-person discussion. For instance, main source or chronological frameworks are sometimes used for annotated bibliographies, which clients should readily recognize.

However, when convention is broken, e.g., by using a matrix format for an annotated bibliography, the material product may need to be explained. In such cases the product may be perceived as a result of synthesis while the explanation -- usually oral and presented by a person knowledgeable in the given field -- may be perceived as interpretive. Although the product may have value in its own right it must be accompanied by discussion in order to be considered an S/I. A form of a

cross-referenced annotated bibliography serves as an example. It looks like a traditional annotated bibliography accompanied by a table full of numbers. Each written paragraph is numbered. The table represents the conceptual framework, using categories or issues as headings of columns. Each column contains the numbers of the paragraphs relating to a particular issue. The client can thus explore any given issue across several sources. The product was presented to the client with an hour-long discussion of issues and implications.

In addition to frameworks of format, which seem to be determined by the nature of the information (content) or by academic tradition, there are constructs suggested by concepts and processes. Thus we have the educational trilogy of knowledge, skills, and dispositions; the dissemination construct of client, context, content, and process. There are change frameworks such as assumptions, history, stages, processes, influences, and effects; problem-solving models such as definition, analysis, generation, evaluation, implementation; planning designs such as identification of constraints, mobilization of support, planning and provision of training and assistance, incremental implementation, monitoring... and so on. Each discipline suggests constructs, analogies, and models, and the possibilities of cross-fertilization are enormous.

Two examples serve as illustrations. The first (a hypothetical example) uses a biological construct to analyze and synthesize elements of competency-based education (CBE). The second (a real example) uses a problem-solving process as a construct to synthesize information on basic skills remediation and to interpret and use that information.

If the construct is the double helix of DNA, the two opposing and intertwined ribbons represent testing and instruction -- the two main elements of CBE. The genetic alphabet of four nucleotides represents curricula areas -- usually reading, mathematics, oral and written communication, and life skills of some kind. The pair-bonding between nucleotides along the ribbons represents the interaction between testing and instruction and among curricula areas and therefore suggests issues and actions.

A CBE synthesis based on a DNA construct would "make the familiar strange," a technique used in synectics to foster creativity and encourage people to re-examine premises, assumptions, or plans. When the client's purpose is to redesign or reorganize an existing system or structure, analogy and metaphor can provide useful tools to stimulate recognition of alternatives.

However, when the client's purpose is to bring about an improvement with as little fuss and bother as possible, a construct which includes content and process and allows the client to draw on his/her own expertise might expedite action.

The context is basic skills; the content is remediation in high schools; the clients are specialists in mathematics, reading and language arts; the construct for the synthesis/interpretation is also the process used to determine action. The process is a model of problem-solving based on the work of Osborn and Parnes. The synthesis/interpretation consists of three parts. The first includes discussion between clients and linker to clarify areas of expertise, and a material product developed by the linker consisting of a form of cross-referenced annotated bibliography. The second part, delivered a week later, consists of an intense small-group problem solving session, requiring contributions of expertise from the linker and the clients. The third part is a discussion paper on basic skills remediation using the problem-solving model as a framework.

When the linker chooses a complex construct based on a process which is to be actually carried out by the clients, strategic planning decisions should be made (by the linker and client) before Area V activities

are begun. The linker should anticipate and try to forecast as accurately as possible the design, development, and delivery of the S/I and choose a framework that fits not only the content and the client's need, but also the linker's operating constraints and opportunities.

The framework chosen for one S/I may or may not be appropriate for others. Factors such as whether or not the S/I must stand alone, whether a materially small synthesis can be reinforced with an oral or audio-visual discussion or simulation, and whether the S/I is for the direct use of the primary client or also for a second (e.g., by turnkey) client group, all influence the choice of a framework and the decision as to whether it is a framework of format or a construct of concept. Regardless of such decisions, client relevance should be the single strongest influence.

The development of material products should be done at the same time or after the design of the delivery system. If it is feasible, an in-person delivery mode should be designed as a part of the synthesis/interpretation. A short stand-alone material product may be an adequate synthesis, but in-person delivery can add the dimension of interpretation, and provide an opportunity for the client and the deliverer to explore alternatives for utilization of the information. Opportunities available for delivery necessarily influence the nature of the products developed. Other influential factors are determined by the responses to the clarification questions (Table 10), and the criteria listed in Table 16.

If operating constraints do not permit in-person delivery, a stand-alone S/I must be produced, possibly accompanied by a cover letter describing the processes used in its development and ways in which the client can get additional information and/or technical assistance. If the linker's organization prefers predetermined response-sets, and/or cannot be directly responsible for providing in-person delivery or follow-up technical assistance, various techniques can be used to help the client in interpretation and use of a stand-alone S/I. Two such techniques are turnkey and tandem.

In a turnkey approach the S/I product is delivered to the primary client who may add to or adapt it to be used with a second client group, e.g., an LEA evaluation specialist receives an S/I on criterion-referenced testing and uses it to assist school principals in developing or selecting test instruments.

In a tandem approach, a hot topic S/I is delivered to all local linkers (generalists) in the state. At the same time the SEA content specialist for that topic tells his/her local contacts about the S/I and suggests ways in which it could be used. If a third group, e.g., institutions of higher education, is involved, the tandem becomes trilateral. The description below, based on a real case, illustrates this approach.

> A hot topic was identified and verified across the state. The state capacity staff coordinated all areas of activity, involving SEA content specialists and SEA staff from the division of teacher certification, and tapping resources at the state university and the Regional Exchange. Three individuals were heavily involved throughout the process: the SEA information linker, the SEA content specialist, and a specialist from the university. The final product

consisted of an overview and four main sections, relating to teacher education, educational strategies, educational assessment, and resources (which included not only bibliographies but also mini-lists from the Resource Referral Service of RDx and other references to individuals and agencies that could provide assistance on the topic). The sections contained a total of about 30 items, some of which were journal article reprints while others were hard copy ERIC abstracts accompanied by the matching microfiche. An introduction, referring to the development and contents of the packet and presenting suggestions for utilization, was written by the university specialist. Complete packets were mailed to all local linkers and all institutions of higher education involved in teacher training. Copies of the table of contents and a cover letter were mailed to all local content specialists. Each of the individuals and groups was informed of the others' involvement and encouraged to explore ways in which they could work together to turnkey the information to teachers. Excluding the initial needs identification, the total turnaround time was six weeks.

Strictly speaking, in the above example the mode of delivery was by mail and the S/I product would be described as a resource packet.

When in-person delivery is feasible, the opportunities for variation increase considerably. Time that might have to be used for writing in the development of a stand-alone S/I can be used in further knowledge building, a more careful or thorough conceptualization of the framework and/or issues and implications, the design of simulations for utilization of the information, or various other activities appropriate to the client's task. The material part of the S/I can be highlights, summaries, tables and other abbreviated messages, while the oral or action part of the S/I can be the equivalent of many pages of narrative. The opportunities should not obscure the constraints. The less development -- precise written communication -- the greater the risk of superficiality, which threatens not only the integrity of the S/I but also the credibility of the synthesizer.

The discussion in the previous section of this paper on Areas V and VI, together with the recommendations made by respondents describe or suggest the nature of most syntheses/interpretations. One of the less common forms of S/I is a workshop. The scenario below illustrates that form.

> The primary respondent (R) has maintained contact with the primary client (C) throughout the three weeks taken to carry out the activities preceding actual development. R has also been in touch with two persons within C's organization; one being the library/resource center director, and the other a person with knowledge relating to the content area. The librarian has agreed to provide back-up services in providing original documents if C needs them. The other contact has provided some site-specific data which R can build into the S/I in examples or simulations for use. R and C agree that three hours can be used for a face-to-face presentation and that five of C's colleagues will also attend.
>
> In order to establish a common knowledge base, R sends the six workshop participants an "advance reading": consisting of one short summary or key paper, a list of no more than 30 major references, and a set of "highlights," which are short verbatim quotations from the references cited that represent core arguments or key issues, and which are grouped by content category rather than source. The advance reading is never more than 20 pages (preferably less than 10).
>
> There are two other material products -- handouts and the file. Handouts are charts, lists or other abbreviated forms used by workshop participants. The file contains: the advance reading; handouts; copies of transparencies used to review the advance reading or summarize the discussion paper; the discussion paper (which is written in plain English and rarely includes citations although it is based on the references cited in the "highlights"); ERIC abstracts and/or copies of one or two fugitive documents; and (when appropriate), descriptions of sample curricula programs, projects, or agencies. Copies of the file are delivered to C and to the library; R keeps a copy for reference.
>
> Although part of the delivery time may be spent in a lecture or discussion format, at least 50% is spent in activities which simulate use of the information. The simulations are built on real site-specific situations and are designed so that participants are most likely to achieve desirable results if they draw on <u>both</u> their own expertise and the information being presented.
>
> When R needs content reinforcement, an expert (from R's organization, C's organization, and/or an institution of higher education), participates in the workshop. Alternatives for follow-up are explored and may or may not involve R.

The turnaround time is usually at least six weeks for this kind of S/I. The information synthesized is drawn not only from sources such as those listed in Table 6, but also from the state or district of the client and from the client and his/her colleagues. Also, since simulation activities are used, information is often drawn from more than one discipline or field. This kind of S/I activity is usually only used in cases where the effort has potentially wide impact or when the content area is a priority at the client's site. Of all the types of S/I described in this paper, this one probably offers the greatest opportunity for appropriate interpretation and utilization. It is probably also the most challenging for the respondent.

Propositions and Questions

Each of the three previous sections of this paper -- relating to the literature, the survey, and the opinion -- are, in a sense, summaries. As stated in the introduction, the set of tables is also a summarizing device. Additional review or summary appears purposeless, but propositions and questions to stimulate discussion and action might be worthwhile. The propositions are organized under three of the areas used in the review of the literature presented at the beginning of this paper: assumptions, products, and processes. The questions are suggested by the survey responses.

Assumptions

- The complexity of the educational system, and the ways in which its organizational components and individuals interact with each other require equally complex behaviors and systems for the analysis, synthesis, interpretation, and application of relevant information.

- A pragmatic perspective of information relevant to a client's task is more appropriate to synthesis/interpretation activities than a prescriptive perspective of information that "ought" to be used.

- In order for a product to be considered a client-responsive synthesis/interpretation, it must satisfy all the following criteria: 1) consensus between client and synthesizer as to the problem addressed, 2) appropriate range of data examined by the synthesizer, 3) data of high quality used, 4) data organized to address the client's problem or task, 5) support (e.g., use of appropriate language) for the client, 6) inclusion of a variety of data, 7) objective and honest presentation of data, and 8) logical coherent integration of data.

- Pieces of data must be examined separately before they can be integrated. Thus synthesis is necessarily preceded by and related to analysis.

- While analysis focuses on the parts, synthesis focuses on relationships between the parts.

- A synthesis product contains information which is coherent and cohesive within a conceptual framework which makes the whole greater than the sum of its parts.

- The framework of a synthesis product may also be an interpretive pattern, which, in traditional synthesis is derived from the information analyzed, but which in client-responsive synthesis is more likely to be influenced by multiple factors.

- Synthesis/interpretation conducted in response to a request from an educational practitioner is influenced by: 1) the client group, 2) the context (socio-technical environment) in which the client operates, 3) the content or relevant knowledge base, and 4) the technology and processes available to and used by the respondent (which includes not only cognitive skills but also dispositions and behaviors stimulated by any of the three factors of client, context, and content).

Products

- There are three general types of synthesis/interpretation products: 1) the traditional type, in which the knowledge base is the primary driving force; 2) the "hot topic" type, responsive to a generally assessed need of a fairly broad audience; and 3) the "tailored" type, responsive to a specific request from an individual client or client group.

- A traditional synthesis is a comprehensive scholarly collection, analysis, and integration of "scientific" knowledge on a specific subject.

- A "hot topic" S/I is a selective collection, analysis, and interpretive integration of knowledge on a subject perceived to be of current importance to the given target audience.

- A "tailored" S/I is a selective collection, analysis and interpretive integration of knowledge relevant to a need or task of current (or immediate) importance to a specific client.

- The range or extent of the information analyzed for any of the three types of S/Is could be identical -- if time and other resources permit.

- Both "hot topic" and "tailored" S/Is are client-responsive: The former is more likely to appeal to a broader audience; the latter may be adapted for a broader audience.

- The results of synthesis/interpretation activity can take many forms including print and audio-visual materials, oral communication, and participatory activities.

- A client-responsive S/I can confirm existing knowledge and/or create new knowledge. When a tailored S/I is combined and used in concert with the client's knowledge further synthesis occurs.

Processes

- In the development of client-responsive S/Is which are rapid turnaround or reasonably short-term, the following areas of activity are essential: I -- clarification of the request (search negotiation); II -- search and retrieval of information; III -- selection and organization of information (analysis); IV -- fit of information and framework (synthesis/interpretation); V -- design and development of the S/I product and delivery system; VI -- delivery.

- In producing a tailored S/I, the success of all subsequent activities and the usefulness of the final product are dependent upon the effectiveness of the search negotiation/request clarification. (Area I).

- It is desirable to use all three methods of search and retrieval -- computer, manual, and human resource contact. (Area II).

- Relevance (to the client's task/need) is the key criterion for selection. It is desirable to satisfy the criteria of repetition, completeness, and cohesion (rather than pressure of time) in concluding the analysis of the information collected. (Area III).

- To claim synthesis, the information must be integrated (not simply collected); to claim interpretation, the language and format used must be appropriate for the client and relevant to the client's task. (Area IV).

- The S/I product and delivery system should be designed to be complementary and to be of maximum potential use to the client. (Area V).

- In-person delivery of S/Is is most desirable. (Area VI).

- A fixed response-set -- where the design of the product and delivery method is predetermined and routinized -- can be used for traditional and hot topic S/Is, but cannot be used for tailored S/Is.

- A philosophy emphasizing the effective delivery of information (rather than technical assistance and/or training) is more appropriate for traditional and hot topic S/Is than for tailored S/Is.

- A philosophy emphasizing technical assistance and/or training suggests that the delivery of tailored S/Is includes opportunities for dialog between the client and the synthesizer/linker and/or simulation of use of the information.

- A "tailored" S/I can be produced in a three week turnaround time, with the 15 work days divided approximately in half -- eight for professional tasks, and seven shared equally between technical and clerical tasks. Such an arrangement may be referred to as rapid turnaround S/I.

- A "tailored" or "hot topic" S/I produced in a six to eight week turnaround time includes "wait" time and time for incubation of ideas. Work days are allocated approximately as follows: technical — 5; professional -- 15; clerical -- 5. This arrangement may be referred to reasonably short-term S/I.

- Skills required in synthesis/interpretation activity include those relating to critical thinking, oral and written communication, and creativity. When the S/I is in response to a client in a hurry, an additional skill is needed -- the ability to balance interacting factors. These factors are the pressures of time and resources, the client's need and preferences, and the integrity of the knowledge base.

Questions

As stated in the section describing the survey results, the questionnaire was not intended to be evaluative. Therefore, questions relating to quality of the products developed were not raised. Neither were data collected as to the quality or quantity of the resources immediately available to a given respondent. However, discussion with some of the

respondents suggests several questions that might well be considered by policy-makers and those engaged in client-responsive synthesis/interpretation.

- Assuming that one person is responsible for all the professional tasks (see discussion of Table 9) and some of the technical tasks, and assuming a three week turnaround time, what is the maximum scope of a high quality synthesis/interpretation produced in response to a direct client request?

- If the amount of time allocated for various tasks remains constant, but the turnaround time changes, how is the quality of the S/I affected (e.g., does increased incubation time facilitate internalization of information and creativity in integration and design)?

- How does the task environment affect those engaged in synthesis/interpretation?

- Under what circumstances are short-term tailored S/Is cost-effective?

- Is it desirable for those engaged in client-responsive rapid turnaround synthesis/interpretation to have various other responsibilities also?

- If developers and/or clients are not satisfied with the results of rapid turnaround S/I might it be due to poor planning -- crisis management? If so, would results improve if developers had more time, possibly through training of users to anticipate needs?

- Why do educational practitioners want S/I products? If the reason implies urgency and tasks of potentially high impact, can existing agencies (given current resources and patterns of management/organization) respond with relevancy and quality?

- Who is best able to produce client-responsive S/Is -- tailored or hot topic, rapid turnaround or reasonably short-term -- a content specialist with an extensive knowledge base, or a generalist with good creative and critical thinking ability? Or both together?

This paper may be perceived as a client-responsive synthesis/interpretation. The National Institute of Education is the primary client, and the secondary clients are the respondents to the survey that provided much of the knowledge base. Since the turnaround time was 10 months, this product is not short-term. However, the processes used in developing this paper were similar in many ways to those described by survey respondents.

It is hoped that, as propositions are tested and questions considered, those engaged in rapid turnaround or short-term client-responsive synthesis/interpretation will become aware of alternatives for improvement and will communicate them to each other and to researchers and policy makers.

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